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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/706,291

11/13/2003

Satoko Shitagaki

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EXAMINER

YAMNITZKY, MARIE ROSE

ART UNIT

PAPER NUMBER

1774

DATE MAILED: 06/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/706,291

Applicant(s)

SHITAGAKI ET AL.

Examiner

Marie R. Yamnitzky

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 April 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 15-27 and 29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 16,22 and 23 is/are allowed.
- 6) ☒ Claim(s) 15,17-21,24-27 and 29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

1. This Office action is in response to applicant's amendment filed April 20, 2006, which amends claims 15-22, 24-27 and 29, cancels claim 28, and provides a replacement drawing sheet containing Figs. 5 and 6.

Claims 15-27 and 29 are pending.

2. In the remarks filed April 20, 2006, applicant states that claims 20, 22, 24 and 26 have been amended to clarify the structure diagram recited in these claims. The examiner notes that no change has been made in the structure diagram shown in these claims relative to the structure diagram shown in these claims in the amendment filed June 30, 2005.

The examiner notes that the double bond pattern of the nitrogen-containing ring of the formulae shown in present claims 15-19 differs from the pattern in the formulae shown in claims 15-19 as set forth in the amendment filed June 30, 2005. The two different patterns are equivalent, but the change is brought to applicant's attention in case the change was not intended.

3. The replacement drawing sheet filed April 20, 2006 is acceptable. The replacement sheet corrects the miscellaneous issue noted in the Office action mailed December 20, 2005.

4. The rejections of claim 28 as set forth in the December 20th action are rendered moot by claim cancellation.

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The rejection of claim 19 under 35 U.S.C. 112, 2nd paragraph, is overcome by claim amendment.

The rejection of claims 15 and 17-19 under 35 U.S.C. 102(b) as anticipated by JP 9-188874 is overcome by claim amendment.

The rejection of claim 19 under 35 U.S.C. 102(e) as anticipated by Li et al. (US 6,723,445 B2) is overcome by claim amendment.

The rejection of claims 16 and 22 under 35 U.S.C. 103(a) as unpatentable over JP 9-188874 is withdrawn. The rejection of claim 23 under 35 U.S.C. 103(a) as unpatentable over JP 9-188874 in view of Li et al. (US 6,723,445 B2) is withdrawn. Applicant's arguments are persuasive with respect to the patentability of claim 16 and dependents over the previously applied prior art.

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 15, 17-19, 20, 24 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 9-188874.

The prior art discloses specific examples of quinoxaline derivatives which are similar to compounds represented by the formulae set forth in present independent claims 15 and 17-19,

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and teaches that the quinoxaline derivatives may be utilized in the light-emitting layer of an electroluminescent device. For example, see claims 1, 6, 9 and 11, paragraphs [0035], [0044]-[0045], compounds III-56 through III-58, III-159 through III-161 and III-262 through III-264, and paragraphs [0139]-[0152].

Compounds III-56, III-159 and III-262 are examples of prior art compounds similar to those represented by the formulae in present claims 17 and 18.

Compounds III-57, III-160 and III-263 are examples of prior art compounds similar to those represented by the formula in present claim 15.

Compounds III-58, III-161 and III-264 are examples of prior art compounds similar to those represented by the formula in present claim 19.

(Portions of the text of the tables defining these compounds were not translated by the machine-assisted translation. The examiner obtained an oral translation from a translator in the USPTO Translation Branch and was informed that the Japanese language text for III-56, III-159 and III-262 describes the formation of a benzene ring by R_{17} and R_{18} , and by R_{27} and R_{28} . The Japanese language text for III-57, III-160 and III-263 describes the formation of a benzene ring by R_{16} and R_{17} , and by R_{26} and R_{27} . The Japanese language text for III-58, III-161 and III-264 describes the formation of a benzene ring by R_{15} and R_{16} , by R_{17} and R_{18} , by R_{25} and R_{26} , and by R_{27} and R_{28} . See formula (III) in claim 6 of JP '874 for the location of the R variables.)

The specific prior art compounds referenced above are similar to the compounds of the present claims, the specific prior art compounds having a substituted aryl group at a position corresponding to one of present X and Y, and having an unsubstituted aryl group at a position

corresponding to the other of present X and Y. While the prior art compounds are required to have a substituted aryl group at one of the positions corresponding to present X and Y, aryl groups are not required at both positions. JP 9-188874 explicitly teaches that R_{13} and/or R_{23} of prior art formula (III) may be an alkyl group or a heterocycle radical. For example, see paragraph [0035].

Regarding claims 20, 24 and 26, which further require the quinoxaline derivative to comprise a thienyl group (a heterocyclic group represented by the formula shown in these claims wherein A represents S) or a furanyl group (a heterocyclic group represented by the formula shown in these claims wherein A represents O), JP '874 teaches that the quinoxaline derivatives may comprise a heterocyclic radical such as a thienyl radical. For example, see paragraph [0044].

It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to make other compounds similar to the specific compounds disclosed by the prior art, and within the prior art guidelines, in order to provide a variety of compounds suitable for use in the prior art invention. One of ordinary skill in the art would have reasonably expected that compounds similar to III-56 through III-58, III-159 through III-161 and III-262 through III-264, having an alkyl group, or a heterocyclic radical such as a thienyl radical, in place of -Ph for R_{13} , (and/or in place of -Ph for R_{23}) would have properties similar to the properties of III-56 through III-58, III-159 through III-161 and III-262 through III-264, and could be used for the same purpose since the prior art teaches that R_{13} and/or R_{23} may be an alkyl group or a heterocyclic radical such as a thienyl radical.

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7. Claims 21, 25, 27 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 9-188874 as applied to claims 15 and 17-19 above, and further in view of Li et al. (US 6,723,445 B2).

JP '874 teaches that the quinoxaline derivative may be used in the light-emitting layer in combination with another luminescent material. For example, see paragraphs [0145] and [0147]. JP '874 does not teach using a phosphorescent material as the additional luminescent material.

Li et al. teach that a quinoxaline derivative may be used as a host material in a light-emitting layer of an electroluminescent device, and that the dopant may be a phosphorescence material. For example, see column 4, line 37-c. 5, l. 14 and c. 8, l. 25-37 of the Li patent.

It was known in the art at the time of the invention that device efficiency of an electroluminescent device can be improved by using a phosphorescent material instead of a fluorescent material.

It would have been an obvious modification to one of ordinary skill in the art at the time of the invention, having knowledge of Li's disclosure that quinoxaline derivatives can be used as host materials for phosphorescent materials in electroluminescent devices, and having general knowledge in the art that device efficiency can be improved by using a phosphorescent material instead of a fluorescent material, to utilize a phosphorescent material in place of a fluorescent material when making a device comprising a combination of luminescent material and quinoxaline derivative as taught, for example, in paragraph [0147] of JP '874.

8. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al. (US 6,723,445 B2).

General formula (I) as defined in column 4 of the patent to Li et al. encompasses quinoxaline derivatives within the scope of a quinoxaline derivative represented by the formula in present claim 19. Li et al. disclose specific examples of quinoxaline derivatives that are similar to a quinoxaline derivative of the formula in claim 19. Li et al. teach that the quinoxaline derivatives may be used in the light-emitting layer of an electroluminescent device. For example, see column 4, line 37-c. 5, l. 14, and see the formulae at c. 6, l. 40-50, c. 7, l. 15-28, c. 10, l. 21-35 and c. 10, l. 52-65.

The compounds represented by the formulae at c. 6, l. 40-50 and c. 10, l. 52-65 are similar to those represented by the formula in claim 19, having an unsubstituted heterocyclic group at each of the positions corresponding to present X and Y. In contrast, when a compound per claim 19 has heterocyclic groups at both of these positions, one of the heterocyclic groups must be a substituted heterocyclic group.

The compound represented by the formula at c. 7, l. 15-28 is similar to those represented by the formula in claim 19, having an unsubstituted aryl group at each of the positions corresponding to present X and Y. The compound represented by the formula at c. 10, l. 21-35 is similar to those represented by the formula in claim 19, having a substituted aryl group at each of the positions corresponding to present X and Y. In contrast, a compound per claim 19 can have a substituted or unsubstituted aryl group at only one of the positions corresponding to X and Y.

X and Y of Li's general formula (I) are independently selected, and possibilities for X and Y include alkyl, aryl and heteroaryl groups when n of Li's general formula (I) is 1. The aryl and heteroaryl groups are not limited to unsubstituted groups.

It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to make other compounds similar to the specific compounds disclosed by the prior art, and within the prior art guidelines, in order to provide a variety of compounds suitable for use in the prior art invention. One of ordinary skill in the art would have reasonably expected that compounds similar to those represented by the formulae at c. 6, l. 40-50 and c. 10, l. 52-65, having a substituted heteroaryl group in place of one or both of the unsubstituted heteroaryl groups at the positions corresponding to X and Y, would have similar properties and could be used for the same purpose since the prior art teaches that the groups at these positions may be heteroaryl groups in general. Further, one of ordinary skill in the art would have reasonably expected that compounds similar to those represented by the four specific formulae referenced above, but having a combination of alkyl, aryl and/or heteroaryl groups at the positions corresponding to X and Y, would be suitable for the prior art purposes since Li et al. teach that X and Y of Li's general formula (I) may independently be alkyl, aryl and heteroaryl when n of Li's general formula (I) is 1.

9. Applicant's arguments filed April 20, 2006 have been fully considered when making the rejections under 35 U.S.C. 103(a) as set forth in this action, but are not persuasive with respect to the patentability of independent claims 15, 17-19, or claims dependent therefrom.

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Applicant argues that the applied prior art does not disclose or suggest the quinoxaline derivatives of present claims 15 and 17-19. The examiner agrees that the prior art does not anticipate the compounds required by these claims, but is of the position that the prior art does suggest these compounds (and teaches their use in an electroluminescent device as claimed).

JP 9-188874 is not limited to the specific examples of quinoxaline derivatives disclosed in the reference. While the quinoxaline derivatives of this reference require a substituted aryl group at one of the positions corresponding to present X and Y, aryl groups are not required at both positions. JP 9-188874 explicitly teaches that R₁₃ and/or R₂₃ of prior art formula (III) may be an alkyl group or a heterocycle radical.

Likewise, Li et al. is not limited to the specific examples of quinoxaline derivatives disclosed in the patent. Li et al. explicitly teach that X and Y may be alkyl, aryl or heteroaryl when n=1, and "aryl" and "heteroaryl" are not limited to unsubstituted groups.

10. Claims 16, 22 and 23 are allowed.

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after

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the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

12. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (571) 272-1531. The examiner works a flexible schedule but can generally be reached at this number from 6:30 a.m. to 4:00 p.m. Monday, Tuesday, Thursday and Friday, and every other Wednesday from 6:30 a.m. to 3:00 p.m.

The current fax number for all official faxes is (571) 273-8300. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (571) 273-1531.)

MRY
June 20, 2006



**MARIE YAMNITZKY
PRIMARY EXAMINER**

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